

Notice of Allowability

Application No.

09/782,441

Examiner

Tuan Quach

Applicant(s)

LAI ET AL.

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to communication filed February 17, 2004.

2. ☒ The allowed claim(s) is/are 13-16, 42-48 and 52-58.

3. ☒ The drawings filed on 13 February 2001 are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.

(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____

7. ☐ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☒ Other Copy of Comm. Related Appl.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

Claims 13-16 and 42-48 are allowed primarily because the prior art do not teach or suggest the claimed limitations as delineated in claims 13 and 42 regarding a method of fabricating an interconnect comprising flowing a first titanium-containing precursor in the chemical vapor deposition reaction chamber, flowing nitrogen in the chemical vapor deposition reaction chamber simultaneously with the flowing the titanium-containing precursor to form a first layer of titanium nitride on the semiconductor structure, flowing a second titanium-containing precursor, flowing at least one gas selected from ammonia and nitrogen trifluoride simultaneously to form a second layer of titanium nitride on the first titanium nitride wherein the second titanium nitride comprises a polycrystalline orientation that comprises a mixture of 1:1 of $\langle 111 \rangle$ and $\langle 200 \rangle$ oriented grains, and flowing an aluminum-containing precursor in the chamber to form an aluminum film having small grain size. Claims 52-58 are allowed primarily because the prior art do not teach or suggest exposing the semiconductor structure to a titanium-containing precursor gas and nitrogen at the respective flowrates and forming a titanium nitride thereon, exposing the semiconductor with the titanium nitride film to a titanium-containing precursor gas and to ammonia or nitrogen trifluoride at the claimed flow rates and forming a second titanium nitride film having a polycrystalline orientation wherein the second titanium nitride comprises a polycrystalline orientation that comprises a mixture of 1:1 of $\langle 111 \rangle$ and $\langle 200 \rangle$ oriented grains, and exposing the structure with the second titanium nitride film having a polycrystalline orientation to an aluminum-


containing organometallic precursor to from an aluminum interconnect where the aluminum has small grain size.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number (571)272-1717. The examiner can normally be reached on M - F from 7 to 4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Wael Fahmy can be reached on (571)272-1705. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571)272-1562.


Tuan Quach
Primary Examiner